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(54) Process for fabricating a tool used in electrochemical maching and tool made by the process

(57) A process for making a tube electrode (102) for shaped-tube electrochemical machining (STEM) is provided. To form the tube electrode, an electrically conductive tube (130) is provided, and an electrically insulating layer (132) is coated on a peripheral surface of the tube, during which a ceramic layer is coated on at least a tip adjacent area of the peripheral surface of the tube by micro arc oxidation, or/and an enamel layer is coated on at least a tip adjacent area of the peripheral surface of the tube by a process where slurry including enamel and a binder is applied onto a surface of a substrate by spraying, brushing or dipping, and the slurry is heated and diffused at a temperature of about 300-1000 degree C. A tube electrode (102) made by the process is also provided.

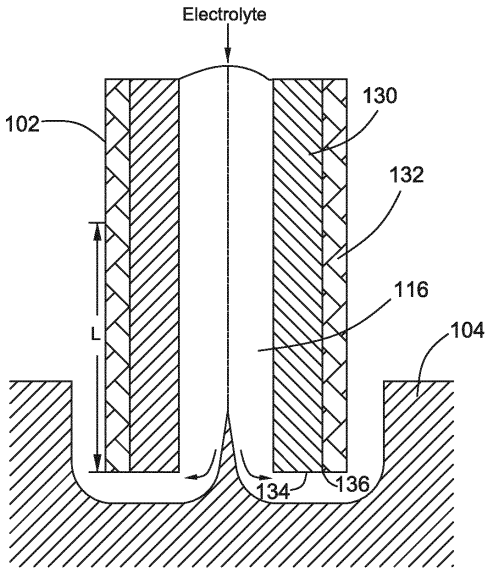

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 2713

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 198 54 793 A1 (UNIV STUTTGART INST FUER FERTI [DE]) 8 June 2000 (2000-06-08) * figure 2 * -----	1,11	INV. B23H3/06 B23H9/14 C25D11/02
A	US 2011/070096 A1 (WEI BIN [US] ET AL) 24 March 2011 (2011-03-24) * abstract * -----	1,11	
A	VANGOLU Y ET AL: "Optimization of the coating parameters for micro-arc oxidation of Cp-Ti", SURFACE AND COATINGS TECHNOLOGY, ELSEVIER, AMSTERDAM, NL, vol. 205, no. 6, 15 December 2010 (2010-12-15), pages 1764-1773, XP027509875, ISSN: 0257-8972, DOI: 10.1016/J.SURFCOAT.2010.08.042 [retrieved on 2010-08-20] * page 1, column 1, paragraph 1 * -----	1,11	
A	US 6 303 193 B1 (GUIDA RENATO [US] ET AL) 16 October 2001 (2001-10-16) * column 4, lines 10-15 * -----	8,9	TECHNICAL FIELDS SEARCHED (IPC) B23H C25D
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 October 2015	Jaeger, Hein

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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EUROPEAN SEARCH REPORT

Application Number
EP 14 19 2713

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 276 987 A (WILLIAMS LYNN A) 4 October 1966 (1966-10-04)	1,5,6,8, 10,11, 14,16	
A	* column 11, lines 41-62 *	7,9,13, 15	

			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 14 19 2713

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 2-4, 12(completely); 1, 8-11, 14-16(partially)

   Process for making a coated tube electrode and a coated tube electrode, wherein the coating is a ceramic coating made by micro arc oxidation.

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2. claims: 5-7, 13(completely); 1, 8-11, 14-16(partially)

   Process for making a coated tube electrode and a coated tube electrode, wherein the coating is an enamel layer.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 19 2713

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-10-2015

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82